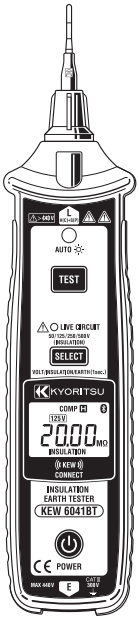
Instruction manual



INSULATION EARTH TESTER

KEW6041BT

KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

Contents

1. Safety warning

This instrument has been designed, manufactured, and tested according to IEC 61010-1: Safety requirements for Electronic Measuring apparatus, and delivered in the best condition after passing quality control tests.
This instruction manual contains warnings and safety procedures which have to be observed by the user to ensure safe operation of the instrument and to maintain it in safe condition. Therefore, read through these operating instructions before starting to use the instrument.

⚠ DANGER

- Read through and understand the instructions contained in this manual before starting to use the instrument.
- Keep the manual at hand to enable quick reference whenever necessary.
- The instrument is to be used only in its intended applications.
- Understand and follow all the safety instructions contained in the manual.

It is essential that the above instructions are adhered to.
Failure to follow the above instructions may cause injury, instrument damage and/or damage to equipment under test. Kyoritsu assumes no responsibility for damage and injury caused by misuse or not following the instructions in the manual.

The symbol ⚠ indicated on the instrument means that the user must refer to the related parts in the manual for safe operation of the instrument. It is essential to read the instructions wherever the ⚠ symbol appears in the manual.

⚠ **DANGER**	is reserved for conditions and actions that are likely to cause serious or fatal injury.
⚠ **WARNING**	is reserved for conditions and actions that can cause serious or fatal injury.
⚠ **CAUTION**	is reserved for conditions and actions that can cause injury or instrument damage.

⚠ DANGER

- Never apply the following voltages to the instrument:
  CAT III 300 V/ CAT IV 150 V (voltage to earth), over 440 V (line voltage)
- Do not attempt to make measurements in the presence of flammable gases; otherwise, the use of the instrument may cause sparking, which can lead to an explosion.
- Never attempt to connect the test leads if the instrument surface or your hand is wet.
- Be careful not to short-circuit a power line with the metal parts of the test lead during a measurement. It may cause personal injury.
- Never open the battery compartment cover during a measurement.
- Keep your hand and fingers behind the protective fingerguard during a measurement.
- Verify proper operation on a known source before use or take actions as a result of the indication of the instrument.

⚠ WARNING

- Do not use the instrument or test leads if any abnormal conditions, such as broken cover or exposed metal parts are noted.
- First, firmly connect the test leads to the instrument, and then press the test switch.
- Never install substitute parts or make any modifications to the instrument. Send the instrument to your local Kyoritsu distributor for repair or re-calibration.
- Do not try to replace batteries if the surface of the instrument is wet.
- Connect the L-shaped banana plug of MODEL 7248 firmly into the E terminals.
- Before opening the battery compartment cover for battery replacement, ensure that the instrument is off.
- Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.

⚠ CAUTION

- Power off the instrument and disconnect all test leads after use. Remove batteries if the instrument is to be stored and won't be used for a long period.
- Do not expose the instrument to direct sunlight, high temperature, humidity, or dew.
- Use slightly damp cloth with neutral detergent or water for cleaning. Do not use abrasives or solvents.
- If the instrument is wet, make sure to let it dry before putting it into storage.
- This instrument isn't waterproof. Do not let the instrument get wet. Otherwise, it may cause malfunction.
- Always make sure to set the rotary switch to the appropriate position before making a measurement.

Symbols

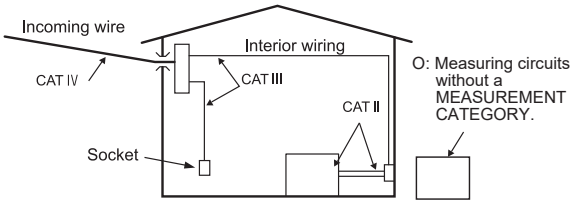
The following symbols are used and marked on the instrument and in this instruction manual. Please carefully check before starting to use the instrument.

	Double or reinforced insulation
	User must refer to the explanations in the instruction manual.
	Earth
	Danger of possible electrical shock
	Do not use the instrument on AC electric systems exceeding 440 V.
	Complies with WEEE Directive (2002/ 96/ EC) marking requirements. (valid in each EU country)

Measurement (overvoltage) category

To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as O to CAT IV, and called measurement categories. Higher- numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II.

O : Measuring circuits without a MEASUREMENT CATEGORY
CAT II : Electrical circuits of equipment connected to an AC electrical outlet by a power cord.
CAT III : Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.
CAT IV : The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).



2. Features

This is a multi-function measuring instrument that can perform simplified earth resistance, Insulation resistance, and AC/DC voltage measurements of distribution lines and electrical appliances (True RMS value of AC voltage is measurable).

- Voltage measurement
  Automatically detect AC/DC of input voltage.
- Insulation resistance measurement
  - Four ranges are available: 50V/ 125V/ 250V/ 500V
  - Auto-discharge function is available: automatically release charges stored within the circuit under test during measurement when the measurement completes.
  - Warning with red backlight when selecting rated voltage of 500 V
- Earth resistance measurement
  - 200/ 2000Ω ranges (auto-ranging)
  - LED and audible warning indicate the existence of large earth voltage.
  - Quite small test current (2 mA max.) prevents unintentional trip of RCD.
- Comparator function allows easy and quick judgement whether the measured value satisfies the reference value or not. (Earth/ Insulation resistance measurement)
- LED light for illuminating measurement points
  (It turns on/off automatically depending on the ambient brightness.)
- LCD backlight works together with LED light.
- Switches glow in the dark places
- Auto-power-off function is also available to power off the instrument when 10 min pass after the last operation.
- Strap for prevent drop
- User replaceable tip metal parts are supplied as standard accessories
- Bluetooth communication
  Remote monitoring and data transfer are possible by pairing tablet devices via Bluetooth.

3. Specification

● Measuring range and accuracy (23℃± 5℃ , 45% to 75%RH)

(1) Voltage/ Earth voltage measurement

Voltage	AC	DC
Display range	0.0 to 450.0 V	0.0 to ± 450.0 V
Measuring range	2.0 to 440.0 V (45 to 65 Hz) (Max earth voltage: 300 V)	± 2.0 to ± 440.0 V
Over-range display	>450.0 V	DC+: >450.0 V
		DC-: <-450.0 V
Accuracy	± 1%rdg ± 4dgt	± 1%rdg ± 8dgt

* AC measurement method: RMS detection
  Add ± 1%f.s. for the waves to the above listed accuracies for other than sine wave of CF<2.5.
  (622 Vpeak or less)
* AC/DC auto-detection: 2 V or higher

(2) Earth resistance measurement

Range (auto-ranging)	200/2000 Ω
Display range	200 Ω : 0.0 to 209.9 Ω
	2000 Ω : 160 to 2000 Ω
Measuring range	0.0 to 2000 Ω
Over-range display	>2000 Ω
Accuracy	± 3%rdg ± 5dgt

Measurement method: Constant current inverter
Approx. 1.6 mA (200 Ω range)/ 825 Hz
Approx. 0.7 mA (2000 Ω range)/ 825 Hz

(3) Insulation resistance measurement

Rated voltage		50V	125V	250V	500V
Range (auto-ranging)		2/20/200 M Ω			
Display range		2 M Ω : 0.000 to 2.099 M Ω			
		20 M Ω : 1.60 to 20.99 M Ω			
		200 M Ω : 16.0 to 200.0 M Ω			
Over-range display		>200.0 M Ω			
Open-circuit voltage		100 to 120% of rated voltage			
Short-circuit current		within 1.5 mA			
Rated current		1.0 to 1.2 mA (at the following resistances)			
		0.050 M Ω	0.125 M Ω	0.250 M Ω	0.500 M Ω
Accuracy	1st effective range	0.100 to 10.00 M Ω	0.100 to 25.0 M Ω	0.100 to 50.0 M Ω	0.100 to 100.0 M Ω
		± 2%rdg ± 2dgt			
	2nd effective range	0.050 to 0.099 M Ω : ± 2%rdg ± 4dgt			
		10.01 to 200.0 M Ω	25.1 to 200.0 M Ω	50.1 to 200.0 M Ω	100.1 to 200.0 M Ω
		± 5%rdg			
	Other range	0.000 to 0.049 M Ω : ± 2%rdg ± 6dgt			

* Max capacitive load: 2uF, discharged within the specified period of time ,10 sec., after a measurement. (IEC61010-2-034)
* Polarity of voltage outputted from the L terminal is negative and the E terminal is positive.

● Applicable standard	● IEC 61010-1, -2-030 CAT III 300 V/ CAT IV 150 V Pollution degree 2 ● IEC 61010-2-034 ● IEC 61557-1, -2, -5, -10 ● IEC 60529 (IP40) ● IEC 61326-1, -2-2 ● IEC 61010-031 MODEL 7248···CAT III 600 V /CAT IV 300 V (Alligator clip should be attached and used in the CAT III or higher environment.) MODEL8253···CAT III 300 V/ CAT IV 150 V (while it is connected to the instrument) * When the test leads are connected to the instrument, the lower category either of them belongs to is applied. ● IEC 63000 (Environmental standard: RoHS)
● Location for use	Altitude 2000 m or less, indoor use
● Nominal system voltage	400 V max Measurable nominal voltage of distribution system (IEC 61557)
● Display	Segment display with backlight
● Operating temperature and humidity range	-10 ℃ to 50 ℃ , 85% RH or less (no condensation)
● Storage temperature and humidity range	-20 ℃ to 60 ℃ , 75% RH or less (no condensation)
● External communication	Bluetooth Ver5.0
● Withstand voltage	3470 V AC (50/ 60 Hz)/ 5 sec. (between electrical circuit and enclosure)
● Insulation resistance	50 M Ω or more/ 1000 V DC (between electrical circuit and enclosure)
● Dimension	232(L) x 51(W) x 42(D) mm (including the tip metal parts)
● Weight	Approx. 230 g (including batteries)
● Power supply	Two AA batteries (Alkaline LR6 is recommended.)

● Operating uncertainty

Operating uncertainty (B) is an uncertainty obtained under the rated operating conditions, and calculated with the intrinsic uncertainty (A), which is an error of the instrument used, and the error (Ei) due to variations.

According to IEC 61557, the maximum operating uncertainty should be within ± 30%.

● Operating uncertainty at earth resistance measurement (IEC 61557-5)

$$B = \pm\sqrt{A^2 + \frac{4}{3}({E_2}^2 + {E_3}^2 + {E_4}^2)}$$

A	Reference conditions
E_1	Reference position ± 90° (N/A since this is a digital tester)
E_2	Variations due to supply voltage (until the low battery level warning symbol "BATT" appears)
E_3	Variations due to temperature change: -10℃ to 50℃
E_4	Variations due to the change of series disturbance voltage 16.67 Hz, 50 Hz, 60 Hz, DC:10 V 400 Hz:3 V
E_5	Variations due to the change of the resistance of auxiliary earth electrodes (N/A for simplified earth measurement method)

* Measuring range to keep the max. operating uncertainty (± 30%) is 5.0 Ω to 2000 Ω.

● Operating uncertainty at insulation resistance measurement

IEC 61557-2

$$B = \pm\sqrt{A^2 + \frac{4}{3}({E_2}^2 + {E_3}^2)}$$

A	Reference conditions
E_1	Reference position ± 90° (N/A since this is a digital tester)
E_2	Variations due to supply voltage (until the low battery level warning symbol "BATT" appears)
E_3	Variations due to temperature change: -10℃ to 50℃

● Number of measurements with the effective battery voltage level (measurement for 5 sec. with a pause for 25 sec.)

Function		Resistance for test	Number of measurements (within effective battery voltage level)
Insulation resistance measurement	50V	0.05 M Ω	1200 times or more
	125V	0.125 M Ω	1500 times or more
	250V	0.25 M Ω	1400 times or more
	500V	0.5 M Ω	800 times or more
Earth resistance measurement		10 Ω	2400 times or more

* Until the low battery warning symbol appears.
* Measurement conditions: Backlight and comparator function (insulation resistance measurement) are turned off.

4. Instrument layout

(1) Instrument body

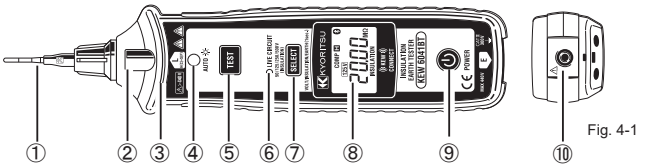


Fig. 4-1

	Name	Details
①	L/ H(C)+S(P) terminal	To connect the replaceable tip metal parts
②	LED light	Illuminate the measurement point. The light turns on/off automatically in relation to ambient brightness.
③	Protective fingerguard	Protective fingerguard is a part providing protection against electrical shock and ensuring the minimum required clearance and creepage distance.
④	Ambient light sensor	To sense ambient brightness for turning on/ off the light.
⑤	Test switch	Resistance measurement is conducted when the switch is held down.
⑥	Live/ Earth voltage warning LED	The red LED blinks for live circuit warning and yellow blinks for the presence of earth voltage.
⑦	SELECT switch	Switch and select the output voltage for insulation resistance measurement, moreover, switch the measurement modes between voltage, insulation, and earth measurements
⑧	LCD	LCD with backlight The backlight turns on/off automatically in relation to ambient brightness.
⑨	POWER switch	To power on/ off the instrument. The switch should be held down for 1 sec. or longer.
⑩	E terminal	To connect the test lead MODEL 7248

(2) LCD

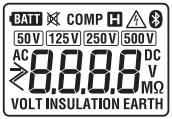


Fig. 4-2

(3) Symbols displayed on the LCD

Symbol	Description
	Indicate the batteries need to replace.
	Show the measured results.
	The “>” symbol appears when the measured result exceeds the display range. (If the measured dc voltage is negative, “<” symbol is displayed.)
	Indicate the end of a measurement with frozen measured result.
	Blink to give a warning for live circuit
	Always displayed on the LCD and blink only at data communication.
	Indicate the buzzer is set to off.
VOLT INSULATION EARTH	Indicate the currently selected mode.
Ω MΩ	Unit for earth resistance and insulation resistance
DC AC —	“AC” for alternate voltages and “DC” for direct voltages. The symbol “-” is a polarity sign for negative voltages.
V	Unit for voltage
COMP	Appear when comparator function is enabled.
50V 125V 250V 500V	Indicate the currently selected rated voltage for insulation resistance measurement.

5. Accessories

● Test lead

Test lead with Alligator clip and Flat test probe MODEL 7248

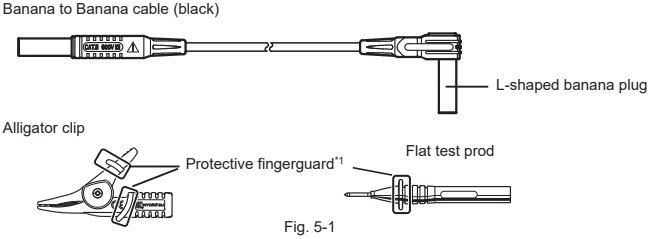


Fig. 5-1

*1 Protective fingerguard

Protective fingerguard is a part providing protection against electrical shock and ensuring the minimum required clearance and creepage distance.

● Metal tip for L/ H(C)+S(P) terminal

(1) Standard prod MODEL 8072A

Fig. 5-2

Standard metal tip

(2) Standard prod MODEL 8253

Fig. 5-3

Molded metal parts

(3) Extension prod long MODEL 8017B

Fig. 5-4

Long type and helpful to access the distant point.

● Other accessories

(1) Carrying case (MODEL 9161)
(2) Strap
(3) Two AA Alkaline batteries
(4) Instruction manual

● Optional accessories

(1) L-shaped probe MODEL 7296

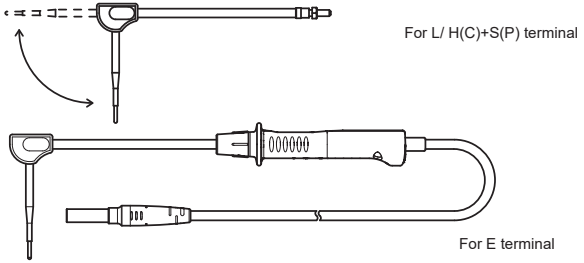


Fig. 5-5

(2) Carrying case MODEL 9198 (for L-shaped probe)

6. Getting started

6-1. Check for battery voltage

(1) Insert batteries in the instrument with reference to "15. Battery replacement".

(2) Hold down the POWER switch at least 1 sec. to power on the instrument.
A long press (1 sec. or longer) is required to get the instrument started to prevent unintentional operation. A long press is also required to power off the instrument.

(3) After powering on the instrument, check if the low battery warning symbol "BATT" is displayed at the upper left corner of the LCD or not. If the symbol is displayed, battery voltage is quite low. Refer to "15. Battery replacement" and replace the batteries with new ones to perform further measurements.

6-2. Preparation

Adapter to be attached to L/ H(C)+S(P) terminal of MODEL 7248 is selectable and changeable depending on the measurement applications.

⚠ DANGER

- Use of the instrument in CAT III or higher environments is allowed only when M-8253 is attached to the instrument and alligator clips are attached to the test leads. The use of M-8072A, M-8017B or Flat test prod may short-circuit the object under test since each of them has large and exposed metal parts.
  Shor-circuit may cause failure of the object under test, fire hazard, or serious injury to the operator or surrounding people.
- Disconnect the test leads from the instrument before replacing the tip metal parts or adapter for test lead to avoid getting electrical shock.

(1) Tip metal parts
Tip metal parts are replaceable depending on the application.
① MODEL 8072A…Standard metal parts
② MODEL 8253…Molded metal parts
③ Extension prod long MODEL 8017B…Long type and helpful to access a distant measurement spot

● How to replace the parts

Detach the tip metal parts by turning the red plastic parts counterclockwise. Install the Tip metal parts you want to use into the hexagon hole and turn the red plastic parts clockwise to tighten firmly.

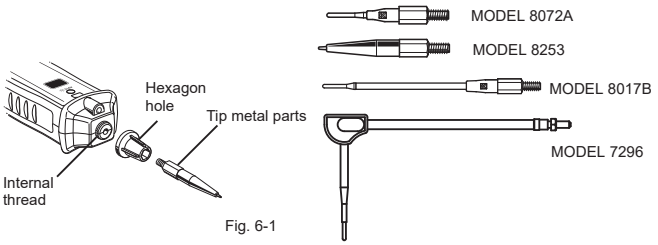


Fig. 6-1

● Angle adjustment of L-shaped probe MODEL 7296

Follow the procedures below and adjust the angle (direction) of the probe tip.

① Loosen the red hexagon part.

② Adjust the probe tip.

③ Keep the desired position and tighten the hexagon part.

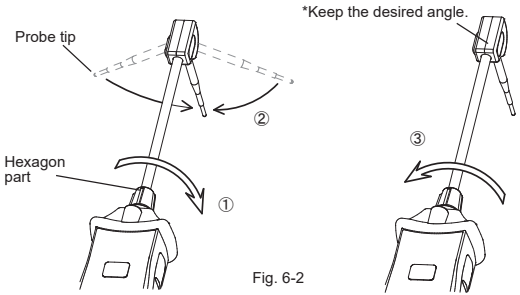


Fig. 6-2

⚠ CAUTION

Tighten the hexagon part and fix the probe tip. Do not try to turn and tighten the tip probe itself so as not to damage the instrument.

(2) Test leads

Attach the either of the following adapters to banana-to-banana cable.

① Alligator clip

② Flat test prod

● How to replace the parts

Firmly connect the desired adapter to the banana-to-banana cable.

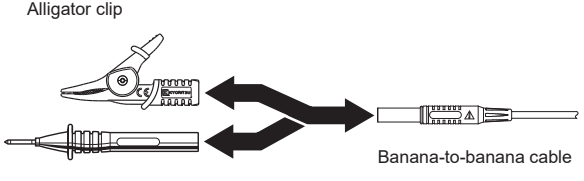


Fig. 6-3

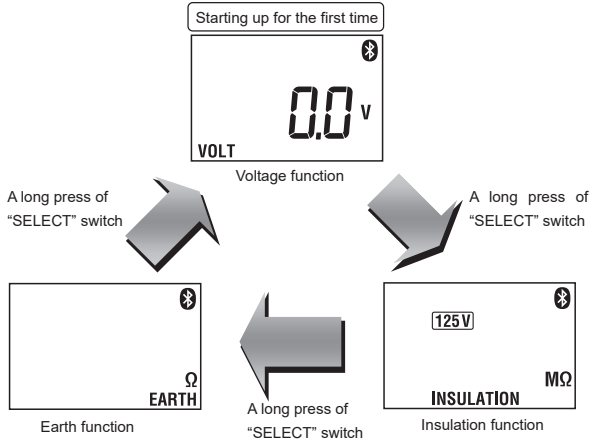
6-3. How to select measurement function

The default setting is voltage measurement function, and it is displayed when the instrument gets started. From the second time or later, the function selected and used before will be displayed.

(1) Switching functions

Hold down the "SELECT" switch at least 1 sec. to switch the functions.

The function switches in the following sequence: Voltage->Insulation->Earth->Voltage···



(2) Switching rated voltages

On the insulation function, you can switch the rated measurement voltage with a short press of "SELECT" switch.

- The rated measurement voltage switches in the following order: 125V -> 250V -> 500V -> 50V -> 125V...
- When switching from 250V to 500V, the red backlight blinks twice to give the high voltage warning.
- The rated measurement voltage setting is not saved. When the instrument gets started again, the default value (125V) is selected.
- By using the special app, various settings become available. Functions disabled via the app will not be shown when powering on the instrument and cannot be selected.

7. Voltage measurement

⚠ DANGER

- Never apply voltage exceeding the maximum measuring range (440 V) of this instrument.
- Keep your hand and fingers behind the protective fingerguard during a measurement.
- Verify proper operation on a known source before use or take actions as a result of the indication of the instrument.

7-1 Measurement method

(1) Connect the test leads to the instrument.
Connect the L-shaped banana plug of MODEL 7248 to the E terminal of the instrument as the figure shows below.

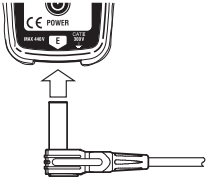


Fig. 7-1

(2) Hold down the "SELECT" switch at least 1 sec. to select Voltage function.
The LCD shows "VOLT".

(3) Connect the adapter for test leads to the earth side and the metal parts (L terminal) to the line side. If the circuit isn't earthed, reversed connections are also acceptable.

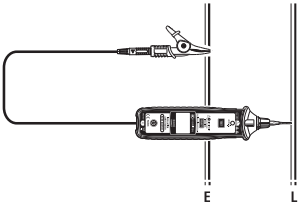


Fig. 7-2

(4) The measured voltage value is displayed on the LCD.
No need to press the test switch. DC/AC is automatically detected and displayed with the measured voltage value.
- For DC voltage, when negative voltage is applied to L terminal side, the "-" (negative) symbol is displayed next to the measured voltage value.
- When the measured voltage is less than 2 V, the symbols of "AC" or "DC" aren't displayed.

A short press of test switch gets the displayed measured values held for 5 sec. (Data hold: The "H" symbol is displayed.)
The data hold function is automatically released in 5 sec.
Another press of the test switch while the displayed value is held can cancel the data hold.

(5) Disconnect the test leads when the measurement completes.

8. Insulation resistance measurement

To inspect the insulation performance of electrical equipment or circuits, use this instrument and measure the insulation resistance of them. Check the voltage rating of the circuit to be measured before making measurement, and select the appropriate voltage applied to.

- Depending on the circuit to be measured, displayed insulation resistance value may not stabilize.
- The instrument may give beep sound during an insulation resistance measurement; however, this is not a malfunction.
- Measurement time may be longer when measuring a capacitive load.
- At an insulation resistance measurement, the voltage outputted from E terminal is positive and of L terminal is negative.
- Connect the E terminal and the earth (ground) terminal at measurement. It is recommended to connect the positive side to the earth side when measuring insulation resistance against ground or when a part of the object under measurement is earthed. Such connection is known to be more suitable for insulation testing since insulation resistance values measured with the positive side connected to the earth are typically lower than those taken through the reversed connection.

⚠ DANGER

- High voltage is generated at the tips of the test leads during insulation resistance measurement. Never touch the tips of test leads or the circuit under test to avoid possible shock hazard. If the test leads are wet, please wipe the test leads and let it dry.
- Do not perform a measurement without securing the battery compartment cover.

⚠ CAUTION

Always disconnect power to the circuit under test before starting insulation resistance measurement. Do not attempt to make measurements on a live circuit. Otherwise, it may damage the instrument.

8-1. Measurement method

(1) Connect the test leads to the instrument.
Connect the L-shaped banana plug of MODEL 7248 to the E terminal of the instrument as the figure shows below.

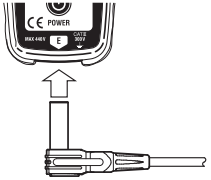


Fig. 8-1

(2) Confirm that no voltage is applied to the circuit under test.
Masure the voltage with reference to "7. Voltage measurement".

- If the measured voltage is 30 V or higher, the instrument gives the following warnings to the user.
  * The "⚠" symbol on the LCD
  * Audible warning
  * Blinking red LCD backlight
  * Voltage value display

  While the instrument is showing above warnings, it doesn't perform insulation resistance measurement.

(3) Hold down the "SELECT" switch at least 1 sec. to switch the function to "INSULATION".
The LCD shows "INSULATION".

(4) Check the voltage rating of the circuit to be measured before making measurement, and press the "SELECT" switch and select the appropriate voltage range.

- When selecting 500V range, the red LCD backlight blinks twice and gives the warning high voltage range is being selected.

(5) Make connections as follows:

- Connect the black test lead, connected to the E terminal, to the earth terminal of the circuit under test.
- Connect the tip metal parts of the L terminal to the circuit under test.

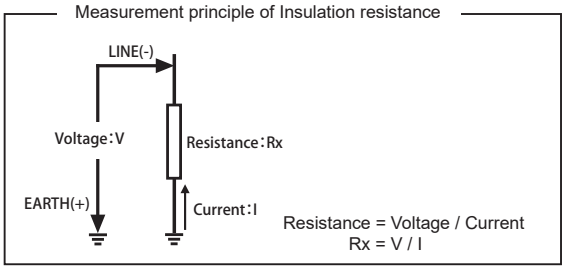


Fig. 8-2

(6) Press the test switch to start a measurement.

- The measured result is displayed on the LCD and the instrument performs insulation resistance measurement continuously during the test switch is held down.
- Measurement stops when the test switch is released, and the measured data is held on the LCD (with "H" symbol).
  A short press of the test switch cancels the data hold function.
  * When voltage of 30 V AC/DC or higher is measured, the instrument gives live circuit warning and shows the voltage value. No operation is acceptable until the voltage drops below 30 V.

[Auto-discharge function]
This instrument has auto-discharge function which allows electric charges stored in the capacitance of the circuit under test to be automatically discharged after measurement. When a measurement completes, leave the test leads connected to the instrument and stop measurement.
Discharge progress can be checked by blinking "⚠" symbol, audible sound, and red blinking LCD backlight.

⚠ DANGER
Never touch the circuit under test right after stopping the measurement. Capacitances stored in the circuit may cause electric shock. Leave the test leads connected to the circuit, and do not touch the circuit until blinking "⚠" symbol goes off.

(7) Disconnect the test leads from the circuit under test when the discharge is completed.

8-2 Comparator function

The comparator function is available on the insulation resistance measurement: a judgment function that compares the measured value with the reference value and informs the user by the LCD backlight and audible warning when the measured value is below the reference value.

The LCD shows "**COMP**" symbol while this function is enabled.

- The following table shows the reference values on insulation resistance measurement with KEW 6041BT.

Rated measurement voltage	50V	125V	250V	500V
Reference value	0.100 M Ω	0.100 M Ω	0.200 M Ω	0.400 M Ω

- When the measured value is below the reference value, the red LCD backlight blinks with audible warning.
- Using the special app, the function can be enabled or disabled.
- The reference value is changeable via the special app. The change of reference value is impossible with the instrument itself.

9. Earth resistance measurement

This instrument has earth resistance measurement function to measure the earth resistance of the distribution lines, interior wiring, and electrical appliances.

⚠ DANGER

- Never apply voltage exceeding 440 V across the measurement terminals of this instrument during earth voltage measurement.
- Do not apply voltage across the measurement terminals of this instrument during earth resistance measurement.

9-1. Measurement principle

This instrument measure earth resistances with fall-of-potential method.
This is a simplified earth resistance tester using the existing earth electrode with low resistance as possible as an auxiliary earth electrode to perform a measurement with two-pole method.

Apply AC constant current "I" between the measurement object "Rx" (earthed electrode under test) and existing earth electrode "re" to obtain the voltage "V" between E terminal and H(C)+S(P) terminal and determine "Re+re". (See Fig. 9-1.)

Rx + re = V / I

The value displayed on this instrument (Re) includes the resistance "re" of an earth electrode and true resistance value "Rx" : that is "Rx + re" value is displayed.

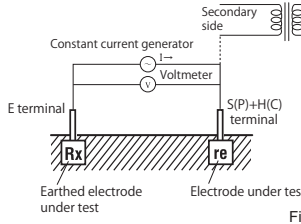


Fig. 9-1

If the value of "re" is already known, deduct it from the measured value "Re" to determine "Rx" value.
Rx (true resistance value) = Re – re

9-2 Measurement method

(1) Connect the test leads to the instrument.
Connect the MODEL 7248 L-shaped banana plug to the E terminal of the instrument as the figure shows below.
(2) Hold down the "SELECT" switch at least 1 sec. and select EARTH function.
(The currently selected function "EARTH" is displayed on LCD.)

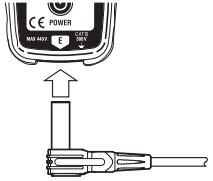


Fig. 9-2

(3) Make connections as follows.

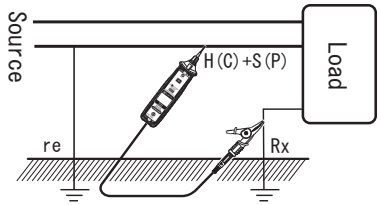


Fig.9-3
Earth resistance measurement of load

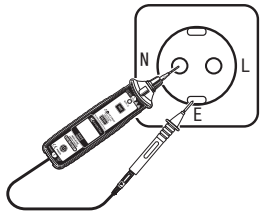


Fig.9-4
Earth resistance measurement of outlet

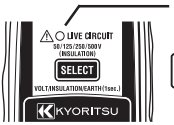
⚠ DANGER

- Always use a voltage detector for testing the earth side of the commercial power supply.
- Do not use this instrument for testing the earth side of the commercial power supply. It is dangerous because the LCD may not show the measured voltage even if the circuit under test is live if the earth of the electrode under test is loose/ disconnected or the connection of the test leads is not proper.

(4) Earth voltage check

Check the earth voltage displayed on the LCD without pressing the test switch.

- The displayed value should be less than 10 V.
  The yellow warning LED starts blinking when the earth voltage is 10 V or higher. (The LED starts blinking at 3 V or higher if the frequency of the earth voltage is over 100 Hz.)



LED blinks in different colors depending on the magnitude of earth voltage.
10 V or higher: Yellow
30 V or higher: Red

Fig. 9-5

Accurate measured results may not be obtained in case that the earth voltage warning LED is blinking. Power off the equipment connected to the earthed electrode under test and get the earth voltage lower before measuring the earth resistance. The earth voltage warning LED might not light up if the frequency is higher than 400 Hz.

- If the measured voltage is 30 V or higher, the instrument gives the following warnings to the user.
  * The "⚠" symbol on the LCD
  * Audible warning
  * Blinking red LCD backlight
  * Voltage value display

  While the instrument is showing above warnings, it doesn't perform earth resistance measurement.

(5) Press the test switch and start a measurement. The measured result is displayed on the LCD and the instrument performs earth resistance measurement continuously during the test switch is held down.
Measurement stops when the test switch is released, and the measured data is held on the LCD (with "H" symbol).

A short press of the test switch cancels the data hold function.
* When voltage of 30 V AC/DC+ or higher is measured, the instrument gives live circuit warning and shows the voltage value. Earth resistance measurement cannot get started until the voltage drops below 30 V.

(6) Disconnect the test leads from the circuit under test when a measurement is completed.

- When a live circuit is detected during an earth resistance measurement, the measurement function switches to voltage measurement, and the instrument gives live circuit warning.
- Trying to make earth resistance measurement while the battery low indicator is displayed may shut down the instrument.

9-3 Comparator function

At an earth resistance measurement, comparator function is available. With this function, the measured value is compared with the reference value (100 Ω) and if the measured value exceeds the reference value, the warnings are given by red LCD backlight and audible warning.

While this function is enabled, the "**COMP**" symbol is displayed on the LCD.

- Buzzer sounds continuously if the resistance is less than 100 Ω.
- If the measured value is 100 Ω or higher, intermittent buzzer sounds three seconds with red blinking backlight.
  * When the LCD shows over-range display once, during a continuous measurement, the judgement for the reference value will be reset and warning indications will be inactivated.
  * While the over -range display is indicated on the LCD, the comparator function will be disabled.
- Using the special app, the function can be enabled or disabled.
- The reference value is changeable via the special app. The change of reference value is impossible with the instrument itself.

10. LCD backlight and LED light

The LCD backlight and the LED light on this instrument turn on/off automatically in relation to ambient brightness. The Ambient light sensor as shown in the below figure senses the ambient brightness.

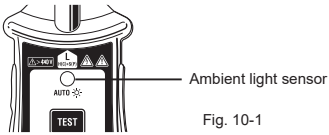


Fig. 10-1

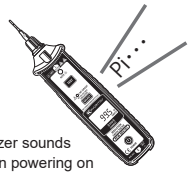
- Dirt on the surface of the sensor may badly affect the proper operation of the lights. Keep the sensor clean.
- The sensitivity of the sensor is not adjustable. Cover the sensor with your hand or finger if you need to turn on the lights. The lights keep on for about 15 sec once they turn on.
- When working at the dimly lit area for a long time, the lights will automatically turn off after 2 minutes of no switch operation. To turn the light back on, press the power switch again (a short press).
  The light will not turn off during a measurement or while live circuit warning is given.
- The light function can be turned on/off by using our special application; it is not possible with the instrument only.

[Turning off the Auto-light mode]

The number of beeps when powering on the instrument is different depending on the selected light modes.
*The red LCD backlight cannot be turned off.

Number of beeps	Light mode
Once	Auto
Twice	Always off

Fig. 10-2



Buzzer sounds when powering on the instrument.

11. Buzzer function

- Buzzer sounds when:
  ① powering on the instrument.
  ② pressing the SELECT or TEST switch.
  ③ live circuit warning is indicated.
  ④ auto-power off function is activated
  ⑤ judgement is done at insulation or earth resistance measurement with comparator function enabled.

- Buzzer can be turned on/off by using our special application; it is not possible with the instrument only.
- The LCD shows "🔕" symbol when the buzzer function is set to off. The symbol isn't displayed on the LCD if the function is on(enabled).

12. Default setting mode

KEW 6041BT has a function to restore all the setting changes via application to default temporarily or totally.
When enabling this function, it automatically reflects to both: restore the settings to default temporarily or totally, vice versa.
Turning on/off this function is possible by using the special app. Restoring the settings to default either totally or temporarily isn't selectable.

12-1. Restore the settings to default temporarily.

Restore the changes made via the application to default (factory setting) temporarily and make measurements.

To enter the default setting mode, follow the instructions below.

(1) Keep the SELECT switch held down and power on the instrument.
(2) The LCD shows "dEF" after powering on the instrument for a second, and then the instrument enters default setting mode. (The LCD switches to VOLT measurement function.)

* "dEF" stands for Default (default setting)

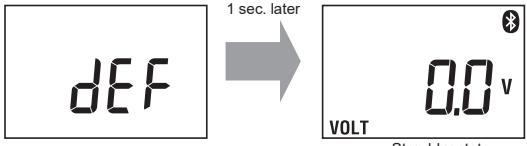


Fig. 12-1

● This is temporary setting; therefore, the settings will be back to the previous ones changed by using the application after powering off and on the instrument.

12-2. Restore the settings to default totally

Restore the changes made via the application to default (factory setting) totally. To restore all the settings, follow the instructions below.

(1) Keep the SELECT switch held down and power on the instrument.

(2) The LCD shows "dEF" after powering on the instrument for a second. In this period, press the SELECT switch twice to go to the reset screen.

*"rSt" stands for Reset.

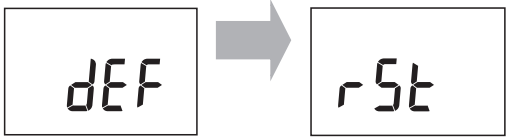
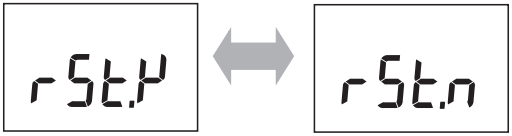


Fig. 12-2 Setting reset screen

(3) Setting reset screen is displayed for a second., and then it automatically switches to the confirmation screen.

● Confirmation screen



"YES" to proceed Fig. 12-3 "NO" to cancel

(4) A press of SELECT switch can switch between YES and NO.

(5) Press the TEST switch to confirm the setting. When settings are complete, buzzer sounds and all the segments on the LCD are displayed and then all the settings restore to default, and the instrument enters stand-by mode.

● When selecting "NO", the settings restore to default temporarily. When powering off and on the instrument, the settings made via the application will be effective.

● When selecting "YES", the settings will restore to default totally.

● This operation can be done via the application as well.

13. Bluetooth communication

This instrument has a Bluetooth communication function and can perform data communication with the compatible devices. Please read through the enclosed sheet about cautions on Bluetooth communication function before starting to use this function.

With this function, KEW 6041BT can perform data communication with Android/ iOS tablet devices.
Before starting to use this function, install the special application "KEW Smart Advanced" in your tablet device. Connection with the internet is required to use some of the functions. For details, please refer to “14. Feature of KEW Smart Advanced”.

14. Features of KEW Smart Advanced

It is possible to check the measurement result from a distant place with your tablet devices by installing the special application "KEW Smart Advanced" in your tablet device.

The special application "KEW Smart Advanced" is available on download site for free: Google Play Store for Android device and App Store for iOS devices. (An Internet access is required.) Please note that communication charge is incurred separately for downloading applications and using special features of it. For your information, "KEW Smart Advanced" is provided online only.

Features of "KEW Smart Advanced" :

- Remote monitoring/ checking
- Data save/ recall function
- Map display
  Measured locations can be checked on the Google Maps if the saved data includes GPS location info.
- Comment editing
  Measured results can be saved with comments.
  The latest information about "KEW Smart Advanced" can be checked with the site on Google Play Store or App Store.

- Settings of KEW 6041BT
  It is possible to change various settings: ON/ OFF of each function, limitation of measurement function, and reference value of comparator function.

The following setting items are available.

(1) Turn on/off each function
  ① Buzzer on/off
  ② Backlight and LED light on/off
  ③ Comparator function on/off for insulation and earth resistance measurements
(2) Limitation of use of measurement functions on each function
(3) Limitation of use of rated measurement voltage on insulation resistance measurement
(4) Change of reference values of the comparator function (EARTH/INSULATION)
(5) Display change of over-range indication (VOLT/EARTH/INSULATION)
(6) Power on the instrument in default setting mode or not
(7) Restore all the settings to default

15. Battery replacement

Replace batteries with new ones when the battery indicator is displayed on the LCD.

⚠ DANGER

- Do not open the battery compartment cover if the instrument is wet.
- Do not replace batteries during a measurement. To avoid getting electrical shock, power off the instrument and disconnect all test leads before replacing batteries.
- The battery compartment cover must be closed and screwed before making measurement.

⚠ CAUTION

- Do not mix new and old batteries nor different types of batteries.
- Install batteries in correct polarity as marked inside.

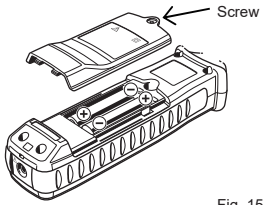


Fig. 15-1

(1) Power off the instrument and disconnect all test leads from the terminal.
(2) Unscrew and remove the battery compartment cover.
(3) Replace two batteries with new ones at once. Observe correct polarity when inserting new batteries. Use of size AA Alkaline battery (LR6) is recommended.
(4) Attach the battery compartment cover and secure it with the screw.

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